Collection of some hints about Debian installation on my D-Link DSM-G600:

t=0x87dff28 [0,0]

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Resources

- wiki at http://dsmg600.info/
- forum at http://forum.dsmg600.info/

firmware (kernel+busybox)

It will fix various problems, including, but not limited to, problems with web interface in firefox.

http://download.dsmg600.info/people/sala/fwimage-04-sala-20070128

I tried to build firmware from source, but had various problems with building gcc. Thet are mostly related to gdb, but after a few random patches it passed compilation (but is broken, because I just commented offending lines).

usbfs

I also want usbfs which generate compilation errors because of missing files in `include/linux/usbdevice_fs.h`
Based on instructions on wiki and post on forum

```
cd /mnt/HD_a2
```

```
export DEBOOTSTRAP_DIR=`pwd`/usr/lib/debootstrap
export PATH=$PATH:/mnt/HD_a2/bin:/mnt/HD_a2/sbin
./usr/sbin/debootstrap --arch powerpc etch /mnt/HD_a2/debian http://ftp.de.debian.org/debian
cp /etc/resolv.conf /mnt/HD_a2/debian/etc/resolv.conf
# prepare chroot jail
mount -t proc proc /mnt/HD_a2/debian/proc
cd /mnt/HD_a2/
./chroot /mnt/HD_a2/debian /bin/bash
# install additional packages
apt-get update
apt-get install locales
dpkg-reconfigure locales
passwd root
apt-get install dropbear hotplug
```

USB printer

Kernel module for USB printers for 2.4.21-pre4 kernel: printer.o

After installation of `cupsys` and `foomatic` all went smoothly, USB printer (Samsung ML-2510) was found and configured automatically. There are a few more details in this forum thread.

Kernel 2.4

As a try to understand this ppc board, I tried to port changes from MontaVista (D-Link used that tree) to current upstream 2.4 kernel and got to the point where SCSI controller times out when reading partition table. This means that board does init, it has serial port which works and has some idea about PCI space (which seems somewhat fishy if you ask me). linux-2.4.34.4-dsmg600.diff.gz

Few more details are available in this forum post.

Kernel 2.6

I have a creazy idea: this device **should** run 2.6! So, here is my work in progress...

According to patches for kurobox which is quite similar to our hardware, there isn't any changes in current upstream version execept for missing drivers. For DSM G600 that boils town to IP1000 network driver, which still isn't in mainland, but seems to be referenced on LKLM as possible inclusion.

- patch against upstream 2.6.21.1 linux-2.6.21.1-dsmg600.diff.gz (adds IP1000A driver for LAN, wifi missing)

Expirince with 2.4 kernel shows that I have to do more porting to make 2.6 port usable. As a start, code for board initialization is specific for DSM-G600 as well as serial port driver. When we have those two things working we can see if `loader.o` could boot our kernel. I think that shouldn't be problem, because `loader.o` origin shows that it's possible to boot 2.6 kernel from 2.4 kernel using `loader.o` module.

New round based on powerpc kernels

After review of current upstream kernel (2.6.22) and state of powerpc kernel.org repository I decided to base my efforts on this branch.

For now here are few useful links:

- dtc compiler: git://www.jdl.com/software/dtc.git
- Kurobox support in stock 2.6 kernels

Compilation notes

Compile kernel and convert it to binary format for loader.o:

```
. env.sh
make
powerpc-linux-objcopy -O binary vmlinux
scp vmlinux disk:/tmp/
```

Then try out your kernel on DSM:

```
cd /mnt/HD_a2 && sync && insmod /mnt/HD_a2/loader.o kernel=/mnt/HD_a2/debian/tmp/vmlinux
```

Please note that **you must use full path** to kernel binary. Also note that all paths are customized for my particular device (to help with copy/paste :-)

Emulation

It's useful to have development environment for DSM on another machine, so I tried to use QEMU to do so.

- patch which adds support for platforms based on MPC82xx
- Installing Debian Sarge for the PowerPC under the QEMU which I updated to etch to be in sync with DSM

This didn't work quite well as described first in this blog post.

My efforts right now are into making GXemul emulate enough of DSM-G600 to boot original D-Link kernel.

Source code

All source code is now available in git repository

Board specification

Here is information that I collected while working on 2.4 port in hope that it will assist me in porting

Memory map

Part of information extracted from u-boot loader, part from kernel source

```
from            to                      size

00000000        02000000        02000000        SDRAM 32Mb

80000000        f0000000        70000000        pci mem space?

fc000000        fcc00000        00c00000        EUMB (PCI I/O space)
fcc00000        fcf00000        00300000        pci cfg regs
fcf00000        fd000000        00100000        pci iack

fe000000        febfffff        00c00000        PCI host bridge

ffc00000        ffffffff        00400000        Flash 4Mb
```

Important addresses:

```
10000000        CFG_MAX_RAM_SIZE, CFG_BANK0_END (u-boot)
40000000        CFG_INIT_RAM_ADDR (u-boot)

c0000000        start of kernel 2.4.21-pre4 VM

80000000 --- PCI memory space ---
bfffd000        PCI 1033:0035 Non-prefetchable memory
bfffe000        PCI 1814:0201 Non-prefetchable memory
c3029f00        PCI 1033:00e0 00:0e.2 irq 2 ciehci_hcd
c3032000        PCI 1033:0035 00:0e.0 irq 1 usb-ohci
c3034000        PCI 1033:0035 00:0e.1 irq -1 usb-ohci disabled
c30ab000        PCI 1814:0201 irq 0 wirel, /sys/cra0
f0000000 --- PCI memory space ---

fc000000 --- EUMB ---
fc040000        OpenPIC_Addr (mpc1)
fc004500        ttyS0
fc004600        ttyS1
fd000000 --- EUMB ---

febffe00-febffe7f : PCI device 1191:0008
febffe00-febffe0f : atp86x
febffee4-febffee7 : PCI device 1191:0008
febffee8-febffeef : PCI device 1191:0008
febffee8-febffeef : atp86x
febffef4-febffef7 : PCI device 1191:0008
febffef8-febffeff : PCI device 1191:0008
febffef8-febffeff : atp86x IDE, irq 4
febfff00-febfffff : PCI device 13f0:1023
febfff00-febffffe : Sundance Technology IPG Triple-Speed Ethernet

ff000000        ROM_CS1_START (on soc?), FLASH_BASE1_PRELIM (u-boot)
ff800000        ROM_CS0_START
ffc00000        FLASH_BASE0_PRELIM (u-boot)
ffc20000        ramdisk load address
fff00000        TEXT_BASE (u-boot)
fff00100        CFG_RESET_ADDRESS
fff10000        boot image load address
```

Important constants:

```
CFG_NS16550_CLK         100000000

CONFIG_SYS_CLK_FREQ     100000000
```

MTD

Addresses are relative to start of mtd at 0xffc00000

```
0x00000000-0x00010000 : "Linux mtd1"
0x00010000-0x00020000 : "Linux mtd2"
0x00020000-0x00300000 : "Linux Ramdisk"
0x00300000-0x00310000 : "U-BOOT BOOT LOADER"
0x00310000-0x00400000 : "Linux Kernel"
```

Kernel configuration options

From old 2.4 kernel, just something to keep eye on while configuring 2.6 kernels...

- CONFIG_6xx
- CONFIG_SANDPOINT
- CONFIG_PPC_ISATIMER

- CONFIG_MTD_PARTITIONS
- CONFIG_MTD_CHAR
- CONFIG_MTD_BLOCK

- CONFIG_MTD_CFI
- CONFIG_MTD_GEN_PROBE
- CONFIG_MTD_CFI_AMDSTD

IRQ

```
sandpoint_map_irq(struct pci_dev *dev, unsigned char idsel, unsigned char pin)
{
        static char pci_irq_table[][4] =
        /*
         *      PCI IDSEL/INTPIN->INTLINE
         *         A   B   C   D
         */
        {
                {   0,  0,  0,  0 },    /* IDSEL 13 - mini-PCI */
                {   1,  -1,  2,  0 },   /* IDSEL 14 - NEC USB2.0 */
                {   3,  0,  0,  0 },    /* IDSEL 15 - ADM983 */
                {   4,  0,  0,  0 }
        };

        const long min_idsel = 13, max_idsel = 16, irqs_per_slot = 4;
        return PCI_IRQ_TABLE_LOOKUP;
}
```

```
static u_char sandpoint_openpic_initsenses[] __initdata = {
        (IRQ_SENSE_LEVEL | IRQ_POLARITY_NEGATIVE),      /* 17, EPIC IRQ 1 - PCI1 - flash*/
        (IRQ_SENSE_LEVEL | IRQ_POLARITY_NEGATIVE),      /* 18, EPIC IRQ 2 - LAN*/
        (IRQ_SENSE_LEVEL | IRQ_POLARITY_NEGATIVE),      /* 19, EPIC IRQ 3 - Not used*/
        (IRQ_SENSE_LEVEL | IRQ_POLARITY_NEGATIVE),      /* 20, EPIC IRQ 4 - Not used*/
        1
}
```

```
sandpoint_init_IRQ(void)
        /* Map EPIC IRQs 0-3 */
        openpic_set_sources(0, 5, OpenPIC_Addr + 0x10200);
        /* Skip reserved space and map i2c and DMA Ch[01] */
        openpic_set_sources(113, 3, OpenPIC_Addr + 0x11020);
        /* Skip reserved space and map Message Unit Interrupt (I2O) */
        openpic_set_sources(118, 1, OpenPIC_Addr + 0x110C0);
        //REX: UART
        openpic_set_sources(121, 1, OpenPIC_Addr + 0x11120); //ttyS0

        openpic_set_sources(122, 1, OpenPIC_Addr + 0x11140);    //ttyS1 jackl
```

mpc10x

```
mpc10x_bridge_init(hose,
        MPC10X_MEM_MAP_B,
        MPC10X_MEM_MAP_B, MPC10X_MAPB_EUMB_BASE)
```

should be changed to:

```
mpc10x_bridge_init(hose,
                MPC10X_MEM_MAP_B,
                MPC10X_MEM_MAP_B,
                0xfc000000) == 0)
```

IO block

consistent with following:

```
-       io_block_mapping(0xfe000000, 0xfe000000, 0x02000000, _PAGE_IO);
+       io_block_mapping(0xfc000000, 0xfc000000, 0x04000000, _PAGE_IO);
```

Serial

```
#define UART0_INT       121
#define UART1_INT       122

#define SANDPOINT_SERIAL_0 0xFC004500
```

```
#define SANDPOINT_SERIAL_1 0xFC004600
```

CPU

```
#define CPU_200 1
#define BASE_BAUD (100000000/16)
```

Led control strings

Taken from Beattie's page about DSM-G600

```
String  Function
SYN     Power led flash, HDD, HDD-Full, USB, WLAN leds off
ZWC     Turn Power Off
ZWO     Power led solid
ZBO     Power led flash
WLO     WLAN led green
WLC     WLAN led off
WBO     WLAN led flash green then off
HDE     HDD led yellow solid
HDC     HDD-Full led off
HBO     HDD-Full led flash yellow
HDN     HDD led off
MMK     USB led green
MMF     USB led yellow
MMC     USB led off
MMI     USB led blink green
MUI     USB led blink yellow
MMN     USB led off
AKO     Unknown
TSO     Power, HDD, USB, WLAN leds green, HDD-Full yellow
TSR     Power, HDD-Full, WLAN leds off, HDD, USB leds yellow
TSC     Power, HDD, HDD-Full, USB, WLAN leds off
```

Chassis Status Strings

```
String  Bit     Function
RKO     0x0001
UKO     0x0002
CKO     0x0004
EKO     0x0008
PKO     0x0100
1KO     0x0200
TS1     0x0010
TS2     0x0020
RKR     0x0040
UKR     0x0080
IOK     0x1000
LOK     0x2000
NOK     0x4000
AKI     0x8000
```